



SAN BERNARDINO MICROWAVE SOCIETY, Incorporated

FOUNDED IN 1955

A NON-PROFIT AMATEUR TECHNICAL ORGANIZATION DEDICATED
TO THE ADVANCEMENT OF COMMUNICATIONS ABOVE 1000 MC.

W6IFE Newsletter

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The **5 November 1999** meeting of the SBMS will have Dave, WA6CGR bring his counter to measure frequency. The SBMS meets at the American Legion Hall 1024 Main Street (south of the 91 freeway in Corona, CA at 1900 hours local time on the first Thursday of each month.. Check out the SBMS web site at <http://www.ham-radio.com/sbms/>. Thanks to the webmaster Chip, N6CA, there are lots of member pictures and items to read.

To all hams, It is with great sadness that I inform you that Al, K6LJM (ex KF6YM) passed away last month apparently from the effects of a severe stroke. We will all miss him.....K6LJMs web page can be seen at <http://home.inreach.com/k6ljm/>. 73 Chip N6CA

Last meeting Chuck, WA6EXV, Doug, K6JEY and Dave, WA6CGR brought their noise figure measuring equipment and measured rigs and amplifiers of the membership. Welcome to new member Sam Luitwieher K6VLM of Lamirada and visitors Mark Sato, KA6PUW of Costa Mesa and Alicia Salazar, KF6WMX of San Bernardino. Bob, W6SYA talked about the passing of Al, K6LJM and about Als activities. 21 people present.

Activity reported at the October meeting --Bob, W6SYA was out during the contest but made few contacts; Ken, WB6DTA was out in the contest but also had few contacts; Sam, K6VLM was out in the contest had made some contacts on 10 GHz; Dave, WA6CGR was out roving during the contest and made a bunch of contacts, but had radios break, Dave also has internet via satellite operations now (check Daves site for 99 contest pictures <http://www.ham-radio.com/sbms/99testpics/99test.html>); Jim, K6ML moved from Arcadia to Vista; Mark Sato, KA6PUW is on 10 GHz ATV as is Hiro Ishizaka, KE6IDA; Doug, K6JEY had limited time to be out in the contest so made few contacts; Kurt, K6RRA was on Signal Hill for the contest; John, KJ6HZ worked on a crystal oscillator for 2.4 GHz LO and a 10 GHz feed; Joe, WA6PAZ had his LO quit during the contest; Mel, WA6JBD roved with 10 and 24 GHz rigs; Alicia, KF6WMX is interested in the microwave bands, Eric ; KD6GLP is moving to Florida; Bill, WA6QYR was out on Heaps during the contest and is building the GPS based reference oscillator found in the July 99 QST; Chuck, WA6EXV was out on Heaps for the contest and is overhauling his VHF/UHF antennas and his 50 ft tower, (Chuck can make patterns and gain measurements on his antenna range from 2 meters up to 24 GHz (biggest dish is 3 ft on 10 GHz and 18 inches on 24 GHz so as to stay within the far field) and people are welcome to come and bring their antennas to test); Gary, W6KVC worked on his 2.4 GHz ATV; Gary, KE6JUV has ATV on 2.4 and 10 GHz; Jeff, KN6VR had his HF uncle out to Heaps to see microwaves in action.

Scheduling-

2 Dec. TBD

6 Jan 2000 TBD

3 Feb. TBD

Wants and Gots for Sale

Want 24 GHz gunnplexer and dish, Alicia KF6WMX 909-384-0034

Want WR-42 90 degree twist and waveguide switch Dave WA6CGR 909-612-5888.

Data from the noise figure measurements at 7 October SBMS meeting

Dave, WA6CGR Eaton 2075 automatic noise figure meter

WB6DTA--W6SNA 1296 MHz preamp 28.7 dB gain and 0.5 dB NF.

W6SWA 1296-144 MHz transverter 22 dB gain and 0.5 dB NF

2304 to 144 MHz transverter 10 dB gain and 2 dB NF

432 MHz preamp 13.2 dB gain and 1.8 dB NF

W6SYA 2304 to 28 MHz transverter 11.6 dB gain and 3.2 dB NF

432 MHz preamp 15.7 dB gain and 1.1 dB NF

KJ6HZ ARR 144 MHz preamp 23.3 dB gain and 0.6 dB NF

ARR 432 MHz preamp 17.7 dB gain and 0.6 dB NF

K6RRA ARR 144 MHz preamp 20 dB gain and 3 dB NF.

6 mtr preamp 19 dB gain and 3 dB NF

WA6CGR Avantek 200-400 MHz preamp at 222 MHz 30.9 dB gain and 2.2 dB NF

Doug, K6JEY had his ST 8419B noise figure meter and served as a tune up bench.

Chuck, WA6EXV--My portion of the SBMS Noise Figure Testing Session, held at the SBMS regular meeting for October, was to measure the noise figure of microwave transceivers. Since only two members brought their systems to the meeting, my part of the test did not take very long! The results are as follows:

CALL RIG DESCRIPTION NOISE FIGURE

WA6QYR 10 GHz Wide Band Gunnplexer 8.7 dB

" 24 GHz Wide Band Gunnplexer 7.1 dB

WA6EXV 10 GHz Wide Band Gunnplexer 12 dB

" 24 GHz Wide Band Gunnplexer 10 dB

The test equipment consisted of: AILTECH 7310 System Noise Monitor; H/P 346C Noise source (10MHz-26.5GHz); 30MHz Variable Gain Amplifier (0 80dB) at 1.2dB NF; 50MHz to 4000MHz Down Converter for transceivers with other than 30MHz I.F.; 0 to 80dB Step Attenuator. 0 to 1GHz; and D.C. Power Supplies

73 --Chuck Swedblom, WA6EXV

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20 stations operated in Northern California and the San Francisco Bay Area during the 1999 ARRL 10-GHz AND UP CUMULATIVE CONTEST. K2IYQ, AA6IW, K6GZA, K6KLY, WA6CDR, WA6KLK, WB6CNI, WF6R, K6MGM, KA6VVE, KF6KVG, KK6MK, W6ASL, W6BY, W6CCY, W6RXQ, W6YX, W7LVO, K7NOM, and W0EOM. Best distance was Robin, WA6CDR, @ 832 Km operating from Mt. St. Helena. The farthest north station was K6KLY operating near Arcata, CA at CN70XB. 4 rovers, W6BY, WA6CGR, K6OW, and KK6MK, ran the valley floor with signals until nearly 2330 hours Sunday September 19! The second station from Southern California to join the "exclusive" membership of THE MT. VACA 10-GHz DXGROUP was WA6CDR during the last Sunday of the contest. Dave, K6OW, joined us last year. Both are SUPERB operators with high performance rigs. It was a pleasure working with both Robin and Dave. 6 stations were out with 24-GHz narrowband rigs: AA6IW, K6GZA, KA6VVE, KF6KVG, W6BY, and WB6CNI. Lars, AA6IW operated with his new 10/24 GHz dual-band feed. And, last but not least, W6ASL operated from his home in Concord, CA at CM87XX the first weekend using Mt. Diablo as a passive reflector, 7 miles distant. The result was 17 QSOs, best distance was 98 Km. Signals varied from "nearly moonbounce with QSB" to S9 +40. This puts a new dimension and thought for a 10 GHz home station at 200-ft. elevation. See you all next year

73jim W6ASL

More on 10 GHz and UP contest

Robin, WA6CDR operated 10 GHz only with 101 Qsos, 36 callsigns, 22K points

Longest DX, N6IZW DM12LQ to WA6CDR CM88QP 832 Km

He operated first Saturday, Heaps, DM14KF, first Sunday, Signal, DM13CO; second Saturday Mt. St. Helena, CM88QP; second Sunday, Mt. Vaca CM88WJ

The most unusual, made the largest number of contacts on the second Sunday, typically that's the day with the fewest contacts. Really enjoyed going up north and working those folks as well as working back down south. (can ANYONE hide from N6XQ? - drive 500 miles, and point the antenna and say hello!). The folks up north came out and worked a lot of contacts. For much of Sunday, we had 4 serious rovers out in the San Joaquin Valley... Two from Socal, and two from Norcal! EXCELLENT. really glad to see the participation! Brian, W6BY and Rex KK6MK from Norcal, Dave WA6CGR and Dave, K6OW from our world ran around the valley making an enormous number of contacts, AND WELL into the night under the new rules! My last QSO with WA6CGR was at 2320 Hrs! These rovers really put out a LOT of work!. Appreciate the Norcal folks putting up with the invasion! I believe we also have a record for what non microwave folks consider "simplex"... a "mobile to mobile" QSO with dishes pointed at each other, NO ridge, or cloud or airplane to enhance the path, on completely flat ground... from about 30 Ft ASL to about 60 Ft ASL, up the center of the valley Dave, Brian and Rex all worked each other over and over, stop after stop. I think the maximum distance was about 110-115 MILES.... that's darn site farther than you can work mobile to mobile on 2 meters! Early morning propagation wasn't... most areas were covered with a stratus deck or fog for the first several hours each day. best contacts seemed to come just after it all burned off, or about sundown. I had 4 or more QSOs with 8 different stations, (12 with CGR), worked the folks at the Stanford radio club (W6YX) for what he said was their very first QSO on 10G SSB, as well as 5 call signs I have never worked before, 3 up north and two down here! Oddly enough, the day with the fewest QSO, (second Saturday) yielded the most points (with call signs), AND the most points per QSO (337 Km AVERAGE) thanks! robin

2 GHz band proposal

The following info was forwarded several times on internet. The ARRL has come out against the plan. We need to be aware of such proposals to keep what spectrum we have.----

The LA County Sheriff's proposed use of the 2402-2448-MHz spectrum will severely compromise (i.e. - annihilate) the many existing Intelligent Transportation Systems (ITS) users in the 2300-2483-MHz spectrum. A majority of ITS applications employ very low power (+6.0 dBm, +/- 3 dB) FM and spread-spectrum technologies used in highway intersection and traffic video detection applications.

A typical intersection installation includes four (4) or five (5) channelized (see tables below) 2.4-GHz video transmitters - one on each corner of an intersection and the companion receivers installed inside a nearby intersection controller cabinet. The transmitter antennas are omnidirectional and can be either vertically or horizontally polarized. The receiver antenna is typically a flat-panel array oriented straight-up to 'view' the elevated light-standard mounted 2.4-GHz transmitters.

Here is a representation of the existing channelization used in ITS applications:

Manufacturer 'A'

Channel 1 2300-MHz

Channel 2 2325-MHz

Channel 3 2350-MHz

Channel 4 2375-MHz

Channel 5 2400-MHz

Channel 6 2427-MHz

Channel 7 2454-MHz

Channel 8 2481-MHz

Manufacturer 'B'
Channel 1 2418-MHz
Channel 2 2433-MHz
Channel 3 2448-MHz
Channel 4 2463-MHz

As you could imagine, an airborne 2.4-GHz video surveillance system would be detrimental to existing and future ITS operations throughout the greater LA and Orange County area's.

I'd like to forward an electronic version (in any media format) of the LA County Sheriff's proposal for experimental licensing in the 2402-2448-MHz spectrum to the Federal Highway Administration (FHWA) and ITS America administrative offices in Washington, D.C., for their input and possible participation.

Please advise?-Gary Belda

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Tom O'Hara W6ORG
SCRRBA ATV manager
ARRL Technical Advisor for Spectrum Management and ATV

Have just received and read the LA Sheriff application for experimental license for video transmission in 2402 to 2448 MHz band. The purpose of the license application is to demonstrate "that public safety agencies in the Los Angeles area can share use of the underutilized 2402 to 2448 MHz spectrum without causing interference amongst themselves, or to existing entities." (Existing entities include radio astronomy research, amateur radio and industrial/medical instrumentation.) Because of the major investment in commercial equipment, system engineering, and installation (Helicopter, ground mobile and ground fixed), this is a significant threat. This is just the precursor to applying for permanent allocation/assignment. The application is based on a so-called spectrum survey that includes a total of 7.2 seconds (yes, 7.2 seconds) of monitoring time. The document is bulky - too much to fax. I can copy and mail, or we could meet somewhere and distribute copies and discuss.

We don't have too much time. I have asked the ARRL attorney to get in some objections pronto. But there is more to do. Please let me know how you want to proceed. 73, Art W6XD

Tweaking TCXOs

Jack, N6XQ had been interested in a very stable and precise frequency source for a 1296.3XX MHz beacon. I was looking at various approaches to doing this with one of the Qualcomm "1152" synthesizer boards. My first thoughts would have required the 10 MHz reference oscillator to be shifted up by about 2.7 KHz. Chuck, WB6IGP indicated that this was a lot more offset than anything he had ever seen by means of the trimmer adjustment on the larger size (2" by 2") TCXOs. He felt that the most tunable shift he had seen was on the order of 200 Hz or so.

Recently I looked at a new approach using the synthesizer, in which the PLL would operate at approximately 1.25 MHz, which is one of the possible results of re-setting the R register ($10 \text{ MHz}/(R+1)$, where R is an integer from 0 to 9). This would have required the 10.00 MHz oscillator to be offset up in freq. by only 386 Hz for 1296.300, 463 Hz for 1296.310, 579 Hz for 1296.325, or 771 Hz for 1296.350 MHz.

I had a lot of experience as a kid taking clocks apart. They never worked again, but what the heck. I decided to do surgery on one of the TCXOs. It is an EG&G Model T424, 2 X 2 inches with capacitance trimmer available on the side. It is marked "Offset @ 25 deg. C. = 0.0 Hz.". I fired it up beforehand with 12V

and measured the adjustable frequency limits as 9.999926 MHz and 10.000090 MHz, or a total range of 164 Hz.

Then with a propane torch I was able to separate the lid from the TCXO, exposing one more problem. The TCXO is assembled in such a way that I couldn't see the component side of the internal PCB. So I cut in midpoint the five wires which tied the PCB to the five feedthrus, separating the PCB from the cover plate.

Then I could see that the trimmer cap was paralleled by a small fixed cap marked 180 for 18 pF. I cut this 18 pF cap away, fired up the TCXO, and now the adjustable freq. range was 10.000150 to 10.001246 MHz.

The trimmer cap is a good quality tubular ceramic marked "JMC 8064". I think there is a way to figure out its range of capacitance. This is a good project for the student.

I didn't have any smaller value silver micas to replace the 18 pf cap, but this might be a good idea to minimize the dependence on the trimmer setting.

So this TCXO will tune the range desired for the beacon, but the impact on temperature compensation is TBD. I did run it for about an hour after reassemble and setting it to 10.000771. After a few Hz initial drift it seemed to stay at 10.000678 for as long as I kept it on.

If we were to use this in a synthesizer for 1296.325 for example, the TCXO would be set to 10.000579 MHz, and the synthesizer rewired for N= 1037, M=102, A=7, and R=7. I don't know about the mods required to the PLL loop filter to make it happy at 1.25 MHz. The M, A, and R settings apply to any frequency in the 1296.3XX range, only the TCXO needs to be tweaked. After the Microwave Update, maybe we can try this out with an 1152 board and see how it flies. Jack plans to keep his beacon TX indoors at his Pt Loma home, so temperature extremes should be reasonable as long as he pays his SDG&E bills. Any comments are welcome. 73s from Ed, W6OYJ

A correction to last months notes on Phil, W6HCC operation in Colorado--Hi bill, Glad you are back from your Boy Scout adventure. One small correction to the note in the bulletin. My 24 GHz rig is narrowband (SSB/CW) not wide band FM. Additional info re 24 GHz. After the initial 1 mw 24 GHz contact, I rebuilt the rig to 'phase 2' configuration. Now it has a measured power output of 60 mw and a receiver noise figure of 4-5 dB. I operated as a rover during the Sept. leg of the contest. I made 8 contacts with 2 stations. The best DX was 120 Km from Boulder to Cheyenne. The rig is built in the box on the back of the 24 in. Macom dish (like the one that Dave K6OW has) with the power supply and frequency reference in a separate box in the rack on the truck. The dish mounts on the pedestal that used to hold the 4' dish for the 10 GHz rig. I built a 24192.0000 beacon using an 8.000..... MHz ovenized crystal and a brick locked to 12.096.000 MHz. I have an active doubler to 24 GHz which will put out 6 mw. I put a small 8 in dish on it. I have been running tests where I set up the beacon at the house and then drive out and see where I can hear it. It was S1-S3 over a 60 mile path to Boulder. One of the things I have seen that is different than 10 GHz. The signals do not scatter well over a moderately obstructed path. e.g. I went about 20 miles south and east. There is a small hill on the east side of Interstate 25. The signals were S9+20db at the top of the hill. I continued about 2 miles past the top of the hill, and the signals were barely detectable! I have repeated this in other tests too. It appears that 24 GHz does not scatter well over the top of hills. More later as I learn more about 24 GHz propagation. 73 Phil, W6HCC

Web updates

Hello everybody, At last night's meeting of the Microwave group of San Diego, I agreed to send all our group a list of web pages related to amateur radio microwave. Also I will show how to sign up for the San Bernardino Microwave Society (SBMS) "Reflector" which broadcasts short items , of MICROWAVE INTEREST ONLY, to those who subscribe. Note that many of these pages have links to other pages, especially G3HPO's page has a huge number of links. So here goes:

The SBMS Web page: <http://www.ham-radio.com/sbms/>

To subscribe to the SBMS Microwave Reflector send email to "sbms-request@ham-radio.com" with your name, email address, and a request to either subscribe or be removed .

To send email for broadcast on the reflector, you must be a subscriber. The mail must be brief. no spam allowed. send to:"sbms@ham-radio.com "

The W6OYJ, San Diego microwave home page is at "<http://ourworld.compuserve.com/homepages/edmunnn> "

N1BWT Paul Wade page: "<http://www.tiac.net/users/wade> "

W6BY Brian Yee page: "http://reality.sgi.com/byee_mti/w6by.html "

G3PHO World Above 1000 MHz page:

"<http://www.geocities.com/SiliconValley/Vista/7012/ghz.htm> "

SM6LKM page: "<http://home.swipnet.se/~41522/> "

Down East Microwave: " <http://downeastmicrowave.com>"

SHF Microwave Parts Co: "<http://www.shfmicro.com> "

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All of these worked when I surfed them this morning. 73s and have fun!! Ed, W6OYJ

Today I uploaded the beginning of some new pages in the San Diego Technical Section of the Technical Articles Section of the SBMS Web Pages. As I/we are busy here getting ready for the Microwave Update trip this week, these pages are only a start. They include two versions of Excel(97) spreadsheets showing how to modify the Qualcomm 3036 Texas style synthesizer, and the older "1152" synthesizer. You can enter your own choice of desired VCO frequency and/or PLL frequency and see what pins need to be modified to make the VCO lock up on a particular frequency. These are by N6IZW.

The Excel spreadsheets are in a single zip file that self-expands after you discover where it has arrived in your computer, and double click on its name "txs3036.zip".

Also I included the pinout diagram for the 2" by 2" TCXOs which have been widely distributed.

There is also an article I wrote on Polaplexer design and some BASIC software programs that were uploaded to the Web pages last May.

We have our meeting tonight here at N6IZW's QTH. If there is any more news I will send it tomorrow.

73s from Ed, W6OYJ

A pointing angle program from Phil, W6HCC

Here is a program I wrote for the TI-86 Calculator. It should work on any TI with string handling capability. I pass it along for anyone who can use it. Hope someone will find it useful.

// Program for TI-86 by Phil Lee, W6HCC 10-17-99

```
// Program to calculate lat/lon and bearing/dist from 2 Maidenhead Grids
// Program should run on any TI calculator with string capability
// Program is named G1 in calculator
// Calculator must be in 'degrees' mode, -> is 'store to variable' operator
```

```
CILCD // clear the screen
1->A.....24->X // set A=1.....X=24 inclusive
InpSt "Enter Grid1: " GR // prompt and string input to string GR
GRIDLL // subroutine: grid string to lat/lon
LA->RR // store lat(LA) from subroutine in RR
-LO->SS // store lon(LO) in RR, subroutine returns
// negative (West) lon, must be positive for
// great circle calculations
InpSt "Enter Grid2: " GR // prompt for 2nd grid, input to string GR
GRIDLL // subroutine: grid string to lat/lon
XX=LA // store lat(LA) from subroutine in XX
YY=-LO // store lon(LO) in YY (negative as before)
Disp "LAT, LON" // title for lat/lon display
Disp RR,SS,XX,YY // display station and target lat/lon
Pause // hold lat/lon display
Fix 3 // set display for 3 decimal place display
DIST = 60*acos( sin RR * sin XX + ( cos RR * cos XX * cos(YY - SS)))
// great circle distance, nautical miles
// angles in degrees
Z=DIST/60 // distance to degrees
BEAR = acos(( sin XX - ( sin RR * cos Z ))/( sin Z * cos RR))
// bearing in degrees
B1=BEAR // store bearing in B1
If SS<YY // target is east of station
Then
B1=360-BEAR // correct bearing range to 0-360 degrees
End // end of If-Then
CILCD // clear display screen
Disp "Bearing: True, Mag." // Title for bearing display
Disp B1, B1-MagVar // display bearings, set local magnetic
// variation for MagVar (colorado = 15 deg)
Disp "Statute miles, KM" // Title for distance display
Disp DIST*1.150779, DIST*1.50779*1.60935
// convert nautical miles to statute miles
// and Kilometers and display
```

```
// Subroutine GRIDLL - converts grid square string to lat/lon
// note1: 'Ans' is result of last calculation
// note2: Great circle equations ref: ARRL UHF/EXPERIMENTERS HANDBOOK
// page 9-54
// note3: Grid square conversion ref: QST, January 1989, page 29
```

```
sub(GR,1,1) // returns 1st character of grid (D)M14KF
St>Eq(Ans,LO1) // converts string D to number LO1
sub(GR,3,1) // returns 3rd character of grid DM(1)4KF
St>Eq(Ans,LO2) // converts string 1 to number LO2
sub(GR,5,1) // returns 5th character of grid DM14(K)F
St>Eq(Ans,LO3) // converts string K to number LO3
sub(GR,2,1) // returns 2nd character of grid D(M)14KF
St>Eq(Ans,LA1) // converts string M to number LA1
sub(GR,4,1) // returns 4th character of grid DM1(4)KF
St>Eq(Ans,LA2) // converts string 4 to number LA2
sub(GR,6,1) // returns 6th character of grid DM14K(F)
St>Eq(Ans,LA3) // converts string F to number LA3
LO= 0.0417 +(-180 + 20*LO1) + (-18 + 2*LO2) + (-120 + 5*LO3)/60
// calculate longitude at center of grid sq.
LA= 0.0280 +(-100 + 10*LA1) + LA2 + (2.5 + (LA3-1))/60
// calculate latitude at center of grid sq.
```

Chuck, WA6EXV was interested in extending his 165 mile/267 Km 24 GHz North American record (1997 K6OW Heaps PK, DM14kf to WA6EXV at Walts Point, DM06wp. He had been looking at shooting down the east side of the Sierra Nevada Mountain range in to the San Bernardino Mountains, Heaps PK or some place east of there. On the earlier shot Bill, WA6QYR had been near the mid point in the El Paso Mountains at DM15dl on a ridge at 4240 ft. This way Bill could check that each half was making it to the middle even if the full path wasn't reached. This time Chuck was looking at 10,520 ft Cory PK, NV DM08pk (near Hawthorne, NV.) some 303 miles (488 km) north of Heaps PK. He had made several long distance 10 GHz contacts with super strong signals from Cory in the past, so expected 24 GHz to pass also. Chuck had been told about 8183 ft Conway Summit, DM08ki, (north of Mono Lake, CA) looking down the Owens Valley some 306 miles (492 km) to Heaps PK as another and easier site to get to. Chuck had been waiting for cooler weather to remove some of the water vapor out of the late summer skies. Something to think about since 24 GHz is close to the water absorption wavelength. On 12 October 1999 things looked OK so Chuck drove to Conway Summit while Bill went to the El Pasos. Mel, WA6JBD went to Butler PK, DM14mg, in the San Bernardinios. Butler was further east than Heaps and should make for better alignment down the Owens Valley. Chuck and Bill started things off at around 1030 in the morning, but no contact. Mel arrived on his site around noon and joined the attempt. About 1300 Chuck decided that the shot wasn't going to work because he was facing too much into the Sierras and there was too much haze, so he drove on to Cory PK. Bill and Mel made their 94 miles (151 km) contact about 1320 with signals being just above the noise level on the wideband FM systems. The path between Bill and Mel looks over the Rand Mountain range and is close to line of sight. It worked anyway. Chuck arrived at Cory about 1530 and the routine of alternately sweeping in frequency and angle while the other end stays fixed on heading and frequency. Using a 440 MHz radio and step-recovery diode makes a nice frequency spotter for 24.125/ 24.155 GHz. This search continued until 1700 when Bill had to leave for an evening meeting commitment and Mel closed down also.

The trial continued at 0700 the next morning just before local sunrise. This time Mel had moved further east to Onyx PK, DM14pe. Chuck had freezing weather on 10,520 ft Cory PK during the night, but the view south still had haze. Attempts continued for a few hours in hopes that the path would improve. Attempts between Bill and Mel didn't work either because the path was blocked by massive Red Mountain. Well, the path didn't improve so the operation was closed off a little after 0900 and everyone drove home.

Thanks to the owners of the Gronk network for allowing the rovers to use their radio network for liaison. With winter coming soon to Cory PK, this attempt may have to be postponed until next May if weather doesn't clear up soon. 73s Bill WA6QYR

Microwave Meteors

Fellow microwavers,

This morning I came across an interesting subject in an internet Radio Astronomy news group. A couple of amateur radio astronomers in Brussels have been using their home built 4 GHz systems to detect 850 degree C emissions from aircraft engines at a kilometer circling for landing at Brussels National Airport. More interesting is their claimed detection of the 6000 degree C radiation from a meteor crossing at 80 km.

Below is a copy of the first message posted on this subject. Anyone interested in this can follow the link to their website that lists the details of the meteor trail microwave emission experiments, including the hardware used and the results obtained. Has anyone tried this? Frank WB6CWN

Message de John M. POLARD (polard@skynet.be)
Merlin Observatory - ON4EU - <http://users.skynet.be/polard/amateur.htm>

Together with Miguel we have discovered that the meteors burning in the high atmosphere produce micro waves who can be detected by a simple radio telescope system working as a full power system. We developed a system working like a high speed logger to determine the shape of the meteor

signal. More info can be found at <http://users.skynet.be/polard/meteor.htm>

Best regards

ON4EU-EA4OZ

Please, do not send HTML messages or attached files, they will be bounced.
Submissions radio-astronomy@qth.net

>From NASA's Science News:

The most exciting meteor shower to watch in 1999 will be the Leonids. On Nov 17, 1999 there is a possibility of an historic meteor storm consisting of 500 to 10,000 meteors per hour. The highly-touted 1998 Leonid shower put on a display of 400 meteors per hour in some locations, and sky-watchers

around the world were treated to a rare display of fireballs and long-lasting, colorful meteor trails. Ranier Arlt of the International Meteor Organization has analyzed data from 217 experienced observers and

noted some similarities between the 1998 Leonid shower and the 1965 shower that preceded the Great Storm of 1966. Does the 1998 shower presage a meteor storm in 1999? That remains to be seen. Even if the 1999 Leonid shower is no better than the 1998 shower, it should be one of the best sky shows in many years.

Frank WB6CWN

Here comes the sun. Frank WB6CWN

-----Original Message-----

From: NASA Science News [SMTP:expressnews@sslabs.msfc.nasa.gov]

Sent: Thursday, October 14, 1999 8:28 AM

To: express-delivery@sslabs.msfc.nasa.gov

Subject: Solar Cycle Update

Solar Cycle Update - Updated predictions from NASA scientists place the solar maximum in mid-2000. As activity on the Sun begins to increase toward this broad maximum, we can expect more auroral displays, radio disruptions and power fluctuations. FULL STORY:

http://science.nasa.gov/newhome/headlines/ast14oct99_1.htm

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